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TUBERCULOSIS
ITS NATURE AND CONTROL

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TUBERCULOSIS—ITS NATURE AND CONTROL

One of modern medicine's great achievements has been the steady reduction in the death-rate of tuberculosis.

In 1906, when the Pennsylvania Department of Health was established, 151 persons out of every 100,000 in Pennsylvania died of the various types of tuberculosis, and 129 died of its most familiar form, pulmonary tuberculosis—tuberculous infection of the lungs.

In 1938, less than a generation later, the death-rate from all types of tuberculosis fell almost 72% to 43 out of every 100,000 of population, while the death rate of tuberculosis of the lungs dropped in almost exact proportion to about 39 per 100,000. This represents a saving of 172,000 lives in 33 years.

Encouraging though they are, however, it would be a tragic error to exaggerate the importance of such statistics.

The fact remains that tuberculosis still ranks seventh among the causes of death in both Pennsylvania and the United States. It still is the No. 1 cause of death among persons between the ages of 15 and 45; it is still the chief cause of death among wage-earners, and it is responsible for one-third of the deaths among women between the ages of 20 and 30.

A total of 4,000 deaths a year in Pennsylvania are due to tuberculosis; 12 every day or let us say that somewhere in our state someone dies every 2 hours from tuberculosis.

Tuberculosis is a very ancient disease. The old name for this disease was "phthisis," a Greek word which can be translated as meaning "a wasting away"—and no better definition of the disease's principal character ever has been coined. Neolithic man, the "Stone Age" man, had tuberculosis 13,000 years ago. Little pottery figures have been unearthed in Egypt, dating back thousands of years,

depicting men and women with the typical "hunch-back" of Pott's Disease (tuberculosis of the spine).

The disease always has been most prevalent among the undernourished whose vital resistance is low and easily overcome by disease. In dense populations, which crowd such people together amid unsanitary surroundings, tuberculosis has its best opportunity to spread from person to person. Slum clearance and sanitary housing will help to eliminate it. In other words, the more closely people live in unsanitary contact with each other, the more likely tuberculous infection is to be wide-spread.

Unfortunately, science has no "specific" for this disease. That is, it has not as yet discovered any chemical or serum which, when administered to the patient, will kill or cripple the tubercle bacillus. Furthermore, it differs from other infectious diseases such as pneumonia and typhoid fever which run their course in days or weeks, for tuberculosis may disable its victim for months or years, condemning the patient to semi or complete invalidism.

No disease responsible for so tragic an annual toll as these facts and figures suggest can be regarded as "licked."

Fortunately, neither organized medicine nor the Department of Health nor the non-medical groups which have worked faithfully and tirelessly year after year in the warfare against tuberculosis are under any illusion that it is "licked."

But—and mark this!—tuberculosis can be conquered. It can be reduced to a point where it will be under such complete control that it no longer will be the serious health problem it is today.

The attack consists of three phases: discovery, isolation and treatment. The speed at which this attack can be delivered depends absolutely upon active, continuous co-operation among organized medicine, public health authorities, and the public generally.

It is upon these proven truths that the present program of the Bureau of Tuberculosis Control of the State Department of Health, created and being carried on with the collaboration of organized medicine, is based.

"Discovery," of course, means the early detection of tuberculous infection, even before the external, visible symptoms—the so-called "Clinical signs"—make their appearance.

"Isolation" means the handling of each infected case in such a manner that the patient will not infect other healthy persons. The whole basis of tuberculosis control rests on the fact that it is communicable. Every case comes from another case.

Tuberculosis is NOT hereditary.

"Treatment" means the use of such modern methods, in some cases no more than rest and careful diet, as will restore the individual patient to an active, safe life in his community.

For years, scientific men speculated on the cause of tuberculosis, but it was not until 1882, when Robert Koch, the great German bacteriologist, discovered the tubercle bacillus—the germ which causes tuberculosis—that any real progress was made in prevention.

Although the tubercle bacillus may and does cause other forms of the disease—in the spine, in the joints and in various internal organs—over 90% of all tuberculosis primarily affects the lungs.

The germ develops sometimes slowly, sometimes rapidly in the lung tissue. As it multiplies, it causes the break-down of normal healthy lung tissue, just as a splinter in the hand may cause infection and tissue break-down indicated by the formation of pus. Naturally, if the lung infection is allowed to proceed, and if the body's normal defenses cannot halt it, the lungs become so diseased that they are unable to perform their intended task, and death will eventually result.

An enormous amount of research work is being done and there is reason to believe that, sooner or later, some specific treatment will be found. It is encouraging to remember that it was not until 1932 that a serum for the treatment of most types of pneumonia was perfected; and not until 1938 that a drug, known as sulfapyridine, was discovered which proved specific for most types of the pneumococcus, the germ causing pneumonia. It is encouraging because pneumonia probably is as ancient a disease as tuberculosis.

Until such specific remedies are developed, treatment of tuberculosis rests upon non-specific methods. These include rest, good food, adequate care and sanitary housing conditions in all cases; "pneumothorax" in from 65 to 80 per cent of all cases and, in a few, surgery.

Pneumothorax is a method of painlessly collapsing the diseased lung in order to permit it to rest. Even the diseased lung carries on its automatic expanding and contracting in the process of breathing and this causes irritation of the diseased tissues. The lung is deflated by filling the cavity surrounding it with clean air, just as a toy balloon is deflated by pressing it between one's hands. This air, injected through a needle, gradually escapes, but during the period that the deflated lung is "resting," the other carries on the business of breathing without seriously interfering with the patient's comfort. In many instances pneumothorax treatment speeds recovery.

Of course, the earlier a tuberculous infection is discovered, the smaller is the diseased area, and hence the greater opportunity to slow down and finally halt the action of the germs in breaking down tissue.

For those tuberculosis patients who are unable to afford private care, this is the point where the Bureau of Tuberculosis Control of the Commonwealth's Department of Health steps in.

The Bureau has reorganized 88 State tuberculosis clinics, has established 28 pneumothorax centers, and the necessary x-ray centers so as to serve the clinics, and has embarked upon a huge series of "surveys" to detect the extent of undiscovered tuberculous infection in the State's population generally.

As in every other public health activity of the State, however, the program depends for its success, without reservation, upon two elements in the population: the private physician and the individual.

First of these, the individual: What part must he or she play, not only in re-establishing personal health, but in eliminating himself or herself as a "broadcaster" of infection in the community?

There are a group of symptoms which, singly or in combination, are suspicious. None of them is positive warning that tuberculous infection is established, but each is clear warning that somewhere for some reason the precise, automatic machinery of health has broken down.

Here they are:

1. A general feeling of fatigue, without apparent cause.

2. A general feeling of illness of considerable duration. A doctor will describe it as "general malaise," while his patient may describe it as a "worn out" or "logy" feeling.

3. Continuous loss of weight, especially in the early stages when unaccompanied by other related symptoms of illness.

4. Failure to recover within the normal period from a preceding illness—particularly a cold in the chest, influenza or grippe.

5. A slight fever of 99 or 100 degrees late in the afternoon or evening: that is, a fever ranging from 0.4 to 1.4 degrees above normal.

6. A persistent cough, even without expectoration. Bloody or blood-flecked sputum under such conditions may indicate an active lung condition.

7. Hoarseness, especially if it persists beyond two weeks.

8. Loss of appetite and strength, each closely associated with (1), (2), and (3).

9. Pain in the chest, usually not severe, but noticeable particularly in taking a deep breath.

10. Profuse sweats, particularly at night. Such sweating generally is not noticeable early in the disease.

It must be remembered that not one of these symptoms necessarily indicates tuberculosis. Indeed, most of them may originate from other or wholly trivial causes. A persistent cough may mean excessive use of tobacco. General physical depression and loss of appetite may be brought about by over work or mental worry. Working conditions

and improperly ventilated sleeping arrangements may prolong hoarseness in a cold. A persistent fever, however, always means something. In any event, within a few minutes of your home is your family physician. Go to him, describe your symptoms, and ask him what they mean.

First, your physician will enquire by many questions into the beginning, the symptoms and the progress of your case. In other words, he gets what every physician should have, a "history" of the case. Then follows a physical examination, particularly of the chest. By inspection (looking), by the familiar "thumping" with his fingers, and through use of the stethoscope which amplifies the chest sounds, he may be able to detect by these physical means a diseased spot in the lungs. Examination of the sputum for tubercle bacilli is the most important part of the examination.

The physical signs may be so slight in early tuberculosis that the physician cannot make a diagnosis immediately. In any event, he probably will wish to have the diagnosis confirmed by x-ray. When x-ray pictures of the chest are taken by an expert roentgenologist and analyzed by an expert clinician, they are nearly 100 per cent accurate in determining the presence or absence of tuberculosis except in its microscopic beginning.

Between the physical examination and the x-ray there is another procedure, most frequently used in large public health surveys—in schools, in industrial establishments, in large clinics—which enable the surveying physicians to determine what persons should be x-rayed. X-rays, even when taken by the wholesale with the State's new portable equipment, cost money.

This intermediate step is the so-called "Tuberculin Test"—a simple, painless and inexpensive procedure for determining JUST ONE FACT: has the individual BEEN infected at any time with the tubercle bacillus? A positive reaction to the test means that the person has been infected but is NOT an indication that a person HAS active tuberculosis. A negative reaction means there is no active tuberculosis and probably never was any.

Although somewhat involved, a brief description of tuberculin and its reaction may be of interest, if

for no other reason than to disprove absolutely the occasionally-encountered belief that the test may have harmful consequences. This belief has just as much foundation as the old superstition that handling the ordinary garden toad will cause warts.

When the germ of tuberculosis enters the body, it immediately begins the manufacture of certain chemical compounds as by-products of its growth. These compounds, some of them harmless, remain in the body for a considerable period of time, whether an open tuberculous infection is established or not. This persistence of the by-product of growth in the body forms the basis of the tuberculin reaction.

The most important of the by-products is believed to be the protein molecule—protein being one of the basic elements of living tissue. Now, if a similar substance is injected into the body already accommodating this tubercle-manufactured protein, a reaction will follow. Physicians speak of this reaction as sensitivity of the person to the substance injected.

Tuberculin itself—the substance used for the tuberculin test does not contain any part of the tuberculosis germ from which it is manufactured, and is, therefore, harmless when injected into the skin.

In making tuberculin a tuberculosis "seed"—a tiny fragment of living germs—is "planted" in a liquid known as the "nutrient," a chemical mixture containing all of the elements necessary for the growth of the germs. The flasks in which they are grown are kept in an incubator maintained at body heat—98.6 degrees Fahrenheit. Thus, the flask is really an artificial human body.

In about two months, millions of germs have developed from the original seed, forming a thick crust upon the surface of the nutrient. The entire contents of the flask are then "heat-killed"—subjected to a temperature which will kill every living organism. Then the contents of the flask are run through a filter so fine that all of the germs themselves are filtered out and discarded, leaving only the liquid. This liquid contains all of the by-products manufactured by the germs as they multiplied in the incubator, but none of the germs themselves.

The liquid is subjected to another "super" filtration and a series of "washings" and chemical separations until at last there is remaining only the protein substance, the "effective agent" in the test.

It is perfectly clear, is it not, that this residue is not a germ, but merely a chemical product of a germ which was killed long before the final extraction of its protein was made?

The tuberculin test, frequently called the "Mantoux" test, is performed by placing a definite amount of the tuberculin between the first and second layers of the skin of the fore-arm. In surveying a group, the first "dose" is one hundredth of a milligram, or one one hundred thousandth of a gram. When you realize that a gram roughly weighs one thirtieth of an ounce, you can appreciate how tiny the dose is. If you care for mathematics, the first solution used may be represented as one-three millionth of an ounce.

The person injected returns to the clinic in 48 hours. If tuberculosis has left its impress on the body, a local reaction to the tuberculin results. This is a raised, inflamed weal or swelling at the point of injection—proof that the two proteins have come in contact and reacted.

A negative result almost always means that there is no tuberculosis in the person tested. In rare cases where doubt lingers a second and stronger injection may be made. If there is no reaction to the second injection, medical science asserts that no tubercle bacillus has ever gained a serious foothold in that individual's body.

But suppose that a reaction follows either the first or second injection. What then?

Such reaction, let it be repeated, is NOT proof that the "reactor"—the person tested—has active tuberculosis. It merely is a sign that there was or may now be an infection and that in order to clinch the matter an x-ray examination should be made. It is common-sense medical application of the old saying where there is smoke there MAY be fire.

If the x-ray too is positive—if it reveals a "spot" representing a tuberculous lesion—the physician must determine its extent. If the lesion—(which

merely means a change from healthy to unhealthy or "morbid" tissue)—is small, and if the individual's health otherwise is good, and if home conditions are satisfactory, the sole "treatment" may be plenty of rest, good food and a regular physical check-up, to assure that the lesion is not spreading.

If the infection is well-established, the amount of care, of course, will be greater because of the patient's restricted activity. A sanatorium may be recommended. If the family is financially able to do so, it can obtain accommodations at one of the numerous private institutions. If not, the State sanatoria are available, free of charge.

The present program of the Bureau of Tuberculosis Control aims to release as many sanatorium patients as possible, thereby freeing beds for new cases, through making available in or near every patient's home pneumothorax facilities where treatment may be continued.

For instance, there are many patients in sanatoria who require only regular pneumothorax treatment—"refills," as the physician calls them. Such patients are able to care for themselves, are not open sources of infection, and need only report for regular pneumothorax treatment and examination at the nearest clinic and treatment center.

Retaining such cases in sanatoria is not only unfair to them, but adds an enormous and unnecessary expense to the Commonwealth. For every bed thus emptied, there is a new bed for a newly-discovered case.

Never before in the history of the Commonwealth has it been possible for victims of tuberculosis who are unable to meet the cost to obtain free x-ray examination and free pneumothorax treatment near their homes when regularly referred by their family physicians. Both the clinic and the treatment centers have been located throughout the state geographically so as to be readily accessible to tuberculous patients.

Obviously, as the program develops, such cases as are found will be in their very early stages, will require far shorter periods of treatment, and will be discovered before they have become active

spreaders of infection. Thus, the "turn-over" of patients in the sanatoria will be speeded up, resulting in a greater number of patients treated and therefore in a lower per patient cost to the State and, of even greater importance, a reduced period of inactivity for the vast majority of sufferers from the disease.

But like any other program, this one is not self-starting. Its success depends upon the individual, for whom it was created. Even the average physician cannot know all, see all, hear all.

In the light of present knowledge, there is no reason whatever for even today's death and illness-rate from tuberculosis.

If your physician is to help you, if you are to have the benefits which medicine has made available, you first must help yourself.

Fear of tuberculosis—"phthisiphobia," medicine calls it—is as much in the past as the savage tribe's fear of an eclipse.

With your help, medical science can foresee the time when tuberculosis itself can be made hardly more than an ugly memory to a happier, healthier, more vigorous Pennsylvania.